Station Briefing Papers

Science-Based Solutions for the Four Threats to the Health of the Nation's Forests and Grasslands

Southern Research Station

USDA Forest Service

Research and Development

SRS Contact: Susan Fox (828) 257-4305
R&D Contact: Dave Cleaves (703) 605-4195
OC Contact: Lennie Eav (202) 205-3818

Website: http://www.srs.fs.usda.gov/

FIRE AND FUELS

Current Emphasis

- ✓ Determining the effects of fire and fire surrogate treatments on a range of resources
- ✓ Modeling the dispersion of smoke from prescribed and wild fires
- ✓ Refining ways to use fire and other treatments to restore fire-adapted systems such as longleaf pine.
- ✓ Monitoring a range of forest health monitoring measures using FIA and other approaches
- ✓ Estimating the effects of fire and fuels treatment on threatened and endangered species such as the red-cockaded woodpecker, on aquatic ecosystem health, water quantity and quality.
- ✓ Developing better ways to remove and utilize small diameter material that adds to the fuel load
- ✓ Interpreting the influence of law and policy on outcomes of fire protection.

Research Results

- ✓ Forest systems operate with a vast number of feedback loops. They are unlikely to loop back to the same point—the systems change, alter, and adapt, for better or for worse.
- ✓ Fire is one of many threats and can contribute to forest health when it occurs or applied in the right way.
- ✓ Fire, fragmentation, climate variability, human influences and a number of other stressors are connected in their influences on forest health.

- ✓ Efforts to study them in isolation can miss the interactions that could lead to meaningful management approaches.
- ✓ Healthy forests started with healthy planting stock in the South. Unhealthy nursery stock containing nematodes and weeds still exist and must continue to be researched and managed.

Further Research

- ✓ Determine the influence of fire, invasives, and other stressors on ecological system components.
- ✓ Develop new information sources on forest health for different segments of the public.
- ✓ Identify how knowledge is used by different publics to influence resource management issues.

INVASIVE SPECIES

Current Emphasis

- ✓ Studying the effects of technology development and human mobility on the levels of infestation. Identifying species known to be destructive to southern forests and providing this information to the public.
- ✓ Monitoring representative forestlands for more than 50 invasive plant taxa across the South.
- ✓ Studying the effects of invasive diseases on resources (e.g., effects of oak diseases on aquatic systems).

Research Results

- ✓ Invasive plant distributions vary in distinct patterns:
  - Regionally (invasives are more likely to occur in fragmented forest landscapes).
  - Locally (edges with non-forest vegetation are twice as likely to contain more invasive plants as the forest interior).
  - By species group (e.g., Japanese honeysuckle and privet are more widespread than kudzu and other species because they demand less light and their seeds are dispersed by animals).
- ✓ Southern pine beetle (SPB) outbreaks are associated with stressors such as drought.
- ✓ Longleaf pine has greater resistance to SPB) than other southern pines, which makes it a good candidate for restoring areas devastated by SPB.
- ✓ While hemlock wooly adelgid (HWA) is regarded as a serious threat to eastern hemlocks, only tree -level treatments exist for it but no known defenses are available that can be applied on a landscape scale.

- ✓ Several species of eastern oaks have been identified as potentially susceptible to sudden oak death (*Phytophthora ramorum),* if the SOD pathogen were to move to the East Coast. Other types of *Phytophthora* spp. could also be causing specific diseases and oak decline in the South and the East.
- ✓ Terrestrial and aquatic invasive plants, animals, and diseases are seriously affecting aquatic systems in the Southern forests.

Further Research

- ✓ Characterize and assess the long-term risk trends of invasive organisms.
- ✓ Evaluate the consequences of continued influx and infestation, and of management strategies to control invasives, on forest structure, resilience and composition.
- ✓ Identify new opportunities for controlling the spread of invasives at multiple scales.
- ✓ Re-establish "native" hybrids (e.g., American chestnut) to restore forest values.
- ✓ Develop new biocontrol methods for treating invasives.
- ✓ Gain better knowledge of the life cycles of invasive species and their mechanisms for forest alteration at multiple levels, from individual to stand-level to landscape scale.
- ✓ Assess the localized risk of plant invasions with precision.
- ✓ Design management intervention strategies to reduce the competitive advantage of invaders based on integration of multiple variables such as altered climate variability, forest/river fragmentation, forest/aquatic recreation and visitation, and similar influences.
- ✓ Identify, collect, process, germinate, produce plants, and restore sites with native vegetation.
- ✓ Help managers identify and isolate new invasive species before they become established by providing synthesized scientific knowledge.
- ✓ Understand larger scale influences that accelerate invasive diseases (e.g., climate variability, altered drought cycles, and human demographic influences).
- ✓ Design education programs that will minimize opportunities for potentially invasive species to be imported or escape into the wild.

UNMANAGED RECREATION

Current Emphasis

- ✓ Conducting the National Survey on Recreation and the Environment, a 40-year effort that determines trends in recreation demand.
- ✓ Determining public perceptions and values about public lands for the Southern National Forests joint plan revisions.
- ✓ Estimating the demand for and supply of recreation.
- ✓ Examining questions related to recreation use and management, including soil compaction and soil and water impacts in mountain terrain.

Research Results

- ✓ Patterns of recreation in the South, except for the less popular water-based recreation, are similar to the rest of the country.
- ✓ A growing population is driving rapid growth in recreational activity.
- ✓ Outdoor recreation-based tourism now accounts for 2.51 percent of the Gross Regional Product (GRP) in the South, with the Region's scarce public lands contributing 56 percent of the total GRP.
- ✓ Currently only 7 percent of the South's private land is available for free public access, with the trend toward decreasing access.
- ✓ Recreation demand is increasing on public lands, a relatively scarce resource in the South.
- ✓ Recreation areas will become more congested on public lands which is likely to contribute to the environmental impacts of recreation.
- ✓ Conflicts between nature-based and technology-based activities (e.g., mountain biking and ATV use) will intensify.

Further Research

- ✓ Identify preferences of users for specific kinds of activities and kinds of settings.
- ✓ Quantify specific kinds of resource impacts of different recreation activities and how to mitigate these impacts.
- ✓ Determine the resiliency of landscapes within the national forest system to sustain certain kinds of recreational activities.
- ✓ Evaluate effectiveness of incentives and enforcement programs in mitigating resource damage and maintaining the recreation experience sought by uses of public lands.
- ✓ Develop new tools for managers that can overlay opportunities, preferences and land capabilities to assess the future supply and demand for recreation on public lands.

- ✓ Assess the potential for private lands to contribute to the recreation supply.

LOSS OF OPEN SPACE

Current Emphasis

- ✓ Assessing the nature and extent of fragmentation (e.g., in the Southern Forest Resource Assessment)
- ✓ Refining a fragmentation index that is being applied nationally using FIA data.
- ✓ Evaluating the effects of wildland urban interface growth on fragmentation.
- ✓ Estimating the effects of fragmentation on neo-tropical birds.
- ✓ Evaluating the economic consequences of land-use changes.
- ✓ Modeling the effects of fragmentation water availability, and ecological processes and functions in bottomland hardwoods, long-leaf pine, and freshwater aquatic systems.

Research Results

- ✓ Increasing urbanization is likely to be the single most significant threat to sustainability in the South over the next 20+ years.
- ✓ Resulting stresses from urbanization will accelerate fragmentation, affect future land-ownership patterns, increase pathways for invasive species, diminish biodiversity including TES species, accentuate fire issues, and influence future water supplies.
- ✓ Climate change impacts will interact with urbanization effects to likely to increase future risks.

Further Research

- ✓ Analyze long-term trends that produce, accelerate, or diminish fragmentation.
- ✓ Understand the effects of loss of open space through monitoring.
- ✓ Fundamental changes does fragmentation make in forest productivity, resilience and diversity.
- ✓ Estimate the effects of loss of forest interior on species and ecological communities.
- ✓ Assess the influence of duration of fragmentation on reversing its effects.
- ✓ Develop new ways to use mobility or life history characteristics of organisms to predict the effects of fragmentation.

- ✓ Characterize the effects of river fragmentation, such as reservoirs, on genetic diversity and structure of aquatic species.
- ✓ Identify social, economic and biophysical factors that influence the rate and effects of urbanization.
- ✓ Determine the influence of urbanization and fragmentation on risks presented by disturbances such as fire, insect and disease, invasive species.
- ✓ Evaluate the influence of local ordinances, incentives, and community planning efforts on fragmentation.